sex immediately after conception; this is shown by their relations to some of the secondary sexual characters. In England a woman of 32 years who had never menstruated, had hair on face, etc., and other appearances of a man; an autopsy showed the presence of large tumor on the suprarenal. Bortz, the German surgeon, observed a girl of 16 who took on the characters of the male—beard, deep voice, distribution of hair on body, etc. Post-mortem examination showed tumor on suprarenal. A woman of 26 years was observed by a Dutch physician: she was obliged to shave like a man. Autopsy showed one of the suprarenals enclosed within the ovary. Similar facts have been published by many physicians.

3. *Chemical reactions.*

Is there any means, asks Robinson, of knowing approximately the functional state of the suprarenal capsules in the gravid female? This is worth studying if we are to come to an understanding of sex determination. Violent or obstinate vomiting and other symptoms of suprarenal insufficiency are not constant in their manifestations. He therefore used the Fränkel-Allers test (acid iodate of potassium) to reveal the slightest trace of adrenalin in the urine or blood. He used also the method of Vulpian (perchloride of iron); but found the per-iodate of potassium much more sensitive and certain in its reactions. By these means he foretold the sex of a fœtus in the fourth month.

From all these facts he thinks it is safe to conclude that the adrenalin influences the sex of the developing embryo, at least in the higher vertebrates or in man.

The hypothesis that adrenalin influences the heart-beat has been subjected to experiment and has been confirmed; but the hypothesis that the rate of the heart-beat determines the sex is one that may be tested experimentally, but has not yet been so tested. It is interesting to note that in the clinical observations given by Robinson the heart-beat of the male is higher than that of the female; this is contrary to the commonly accepted relation. The argument, moreover, may prove too much. If maleness is converted into femaleness by the adrenalin directly, or indirectly through the influence of this upon the circulatory system, it should be possible to bring on secondary female characters in a male by the administration of adrenalin before or at puberty.

The number of cases in which the sex was foretold on the basis of the Fränkel-Allers test for adrenalin in the blood or urine is not given by Robinson; presumably too few to warrant statistical conclusions. But even if the number were very large, and even if there should be found a constant relation between the sex of the fœtus and the quantity of adrenalin produced in the pregnant mother, these facts would by no means indicate a causal relation in the sense assumed by Robinson. It is quite conceivable that, in the case assumed, the physiological state of the fœtus determines the activity of the mother's adrenal capsules.

A more general criticism of Robinson's argument lies in the tacit assumption that sex differentiation means one thing in the higher vertebrates and man, and quite a different thing in the rest of the animal kingdom and in plants. It may well be that there are several distinct factors concerned in sex determination, but these must all belong to related categories. It is extremely improbable that sex is determined by an accessory chromosome among insects, by adrenalin among mammals, by traumatism among gramineæ, say, and by ultra-violet rays among mosses. It is interesting to note, in conclusion, that physicians have formulated several theories of sex determination in recent years, but always in complete innocence of the work being done by experimental biologists along this line.

Benj. C. Gruenberg
Commercial High School,
Brooklyn, N. Y.,
December 30, 1911

Societies and Academies

The American Mathematical Society

The one hundred and fifty-seventh regular meeting of the society was held at Columbia University on Saturday, February 24, extending through the

usual morning and afternoon sessions. The attendance included forty-one members. President H. B. Fine occupied the chair. The council announced the election of the following persons to membership in the society: Mr. J. W. Alexander, Princeton University; Mr. A. A. Bennett, Princeton University; Professor J. G. Coffin, College of the City of New York; Professor G. H. Cresse, Middlebury College; Mr. C. R. Dines, Dartmouth College; Professor H. E. Jordan, University of Kansas; Mr. F. S. Nowlan, Columbia University; Professor C. W. Watkeys, University of Rochester. Eight applications for membership in the society were received.

Announcement was made of the gift of Dr. Emory McClintock, second president of the society, of over four hundred valuable books to the library. The gift also includes a large number of pamphlets and reprints of important mathematical papers.

The following papers were read at this meeting:

S. A. Joffe: "Sums of like powers of natural numbers."

G. A. Miller: "Second note on groups generated by operators transforming each other into their inverses."

S. Lefschetz: "On remarkable points of curves."

S. E. Urner: "Certain singularities of point transformations in space of three dimensions."

A. B. Coble: "The characteristic theory of the odd and even theta functions as related to finite geometry."

H. H. Mitchell: "Some quaternary groups with particular prime moduli."

J. E. Rowe: "The undulation and cusp invariants of the R^n."

W. F. Osgood: "A necessary and sufficient condition that a single-valued function in a projective space be rational."

Dunham Jackson: "On the convergence of the development of a continuous function according to Legendre's polynomials."

K. P. Williams: "The solution of non-homogeneous linear difference equations and their asymptotic forms."

E. J. Miles: "Note on the isoperimetric problem with discontinuous integrand."

Dunham Jackson: "On approximation by trigonometric sums and polynomials."

J. E. Hodgson: "Orthocentric properties of the plane directed n-line."

The date of the next regular meeting of the society falls on April 27. The Chicago Section and the San Francisco Section will both meet on April 6.

F. N. COLE,
Secretary

THE AMERICAN CHEMICAL SOCIETY
NEW YORK SECTION

AT the meeting held at Rumford Hall on March 8 the following sectional officers were elected to take office at the close of the present session in June: *Chairman,* Arthur B. Lamb; *Vice-chairman,* David Wesson; *Secretary-Treasurer,* C. M. Joyce; *Executive Committee,* A. C. Langmuir, G. A. Hulett, Allen Rogers and T. L. Briggs.

The Wm. H. Nichols medal (for the session of 1910–11) was awarded to Professor Charles James, of New Hampshire College, for his work on the rare earths.

Dr. W. Gilman Thompson read a paper on "Occupational Poisoning in Chemical Trades."

This paper awakened considerable interest and discussion, the meeting favoring further investigation of the subject and appointing a committee for this purpose.

Dr. A. M. Comey read a paper on "The Testing of High Explosives," illustrated by slides, and Mr. A. E. Marshall spoke on "Silica Ware: Its Manufacture, Properties and Uses."

C. M. JOYCE,
Secretary

THE NEW YORK ACADEMY OF SCIENCES
SECTION OF BIOLOGY

AT the regular meeting of the Section of Biology, held at the American Museum of Natural History, December 11, 1911, Chairman Frederic A. Lucas presiding, Professor Henry E. Crampton gave a lecture, illustrated with lantern slides, on his recent explorations in Guiana and Brazil. Dr. W. K. Gregory concluded his communication on the "Origin of Paired Limbs," reviewing the rival claims of the Crossopterygii and Dipnoi for the ancestry of the Amphibia and reinterpreting the elements of the pectoral limb of the Upper Devonian Rhizodont genus *Sauripteris.*

At the regular monthly meeting of the section held at the American Museum of Natural History, January 15, 1912, the following papers were read:

Phylogeny and Ontogeny of the Horns of Mammals: HENRY FAIRFIELD OSBORN.

The recent discovery of the modes of origin of the horns in the titanotheres, a perissodactyl group remotely related to horses, tapirs and rhinoceroses, permits of a comparison of phylogenesis with the ontogenesis of the horns in bovine mammals. The

latter is based upon an osteological series recently prepared by Mr. S. H. Chubb, the former is based on the rich phylogenic series of Eocene titanotheres in the American Museum of Natural History. The conclusion is that ontogeny closely recapitulates phylogeny, that the genesis is gradual or continuous, that the horns arise definitely and determinately. In the bovine series it seems, in accord with the conclusions of Dürst, that the horn first appears as a circular thickening of the skin, accompanied by accelerated growth of the hair preparatory to the formation of the keratin of the horny substance, at a period considerably prior to any sign of the horn in the bony structure of the frontals. This raises the problem, which will form the subject of a special paper in the *Annals* of the Academy, as to what element first arises in connection with horn evolution, namely: (1) the psychic, or desire to use the horn, (2) the epidermal callous or keratin protection of the bony horn center, or (3) the bony or osseous horn itself. It would appear that the psychic tendency must precede the epidermal and that the latter precedes the osseous, but this disputed point requires further investigation.

Skull Measurements in Man and the Hoofed Mammals: HENRY FAIRFIELD OSBORN.

Comparative anatomists and zoologists have been slow to introduce into mammalogy systems of measurement by indices and ratios, which have proved of such universal value in anthropology. It is found among the hoofed mammals, from studies undertaken by the author with the cooperation of Dr. W. K. Gregory, that *cephalic indices and limb ratios* between different segments of the skeleton are far more significant than systems of direct measurement. These cephalic indices of the gradual changes of proportion between different regions of the skull have the value of specific characters and sharply distinguish members of different phyla. For example in the cross between the horse (*E. caballus*) and the ass (*E. asinus*), it is found that the cephalic indices are transmitted as pure non-blending characters.

Among the most significant indices are the following: (1) the cephalic, which is obtained by dividing the total or basilar length of the skull by the zygomatic breadth; (2) the cranial, which is obtained by dividing the basilar length by the postorbital length of the skull; (3) the facial, obtained by dividing the basilar length by the preorbital length of the skull, etc. The horses show proopic dolichocephaly, or elongation of the face, and a static condition of the cranium, while the titanotheres, in contrast, show opisthopic dolichocephaly, or elongation of the cranium, and abbreviation of the face. Like the phyletic differences of proportion between the horse and the ass, these differences are most exactly expressed by the method of indices.

The application of the ratio method to the limbs of the hoofed mammals has again produced most surprising results. It is found that mammals of different phyla adapted either to "weight" or to "speed" converge respectively toward typical "weight" or "speed" ratios, which are obtained by dividing the length of the lower segments, tibia and radius, respectively, by the upper segments, femur and humerus, metacarpus and metatarsus, respectively. These "weight ratios" and "speed ratios" are far more significant as regards function and phyletic change than the actual or direct measurements.

This subject will be fully treated in the author's forthcoming monograph "The Titanotheres," to be published by the United States Geological Survey.

Whaling in the Olden Time: FREDERIC A. LUCAS.

The speaker exhibited lantern slides illustrating some interesting pictures from old works on whaling and showing the methods practised by the early Japanese, European and American whalers.

At the regular monthly meeting of the section, held at the American Museum of Natural History, February 12, 1912, Professor Bashford Dean presiding, the following paper was read:

Some Factors of Geographical Distribution in South America: JOHN D. HASEMAN.

The speaker outlined his itinerary in Central South America, where he had spent the years 1907–1910 collecting fishes, etc., for the Carnegie Museum and studying the geology, physiography and faunal complexes. He criticized the "static method" of studying geographic distribution as leading to no certain results. He outlined his conception of the geology and former topography of South America as bearing upon the problems of distribution and as being distinctly unfavorable to the "Gondwana land" hypothesis. He also analyzed the faunal similarities between South America and Africa and held that they offered no valid evidence for the former existence of a land bridge between those continents. His results are being published in the *Annals* of the Academy.

WILLIAM K. GREGORY,
Secretary